

## **REMARKS**

Claims 25-47 are pending in the application. Claims 25-45 are under Final rejection for various reasons.

### **Rejection of Claims Under 35 USC §101**

Claims 25-45 were rejected under 35 USC §101 for the following reasons.

In the Office Action as to claims 25 to 31 and 32-36, it is said that Applicants make claim for a number of antenna-forming means for emitting radiation at the frequency  $\omega_2$  recited in independent claims 25 and 32.

In addition, claims 37 and 38 were rejected on the basis of the element of a radar device having a frequency emitting device as in claim 25.

In addition, claims 39 and 40 were rejected on the basis of the statement “as to the radar device of claim 37 recited in claims 39 and 40.

The last basis of rejection cited under §101 is that in claim 35, Applicants make claim for the radar device of claim 38. This appears to be a clear error and it is assumed that the Examiner meant that in claims 41-45 rejection is made on the basis of the dependencies of such claims directly or indirectly on claim 38.

The fundamental reasoning supporting all of the aforesaid rejections is the supposition in the Office Action that radio frequency portion of the electromagnetic spectrum with a cutoff in the Gigahertz range is not compatible with input from a laser which emits in an optical range. In other words, the Office Action seems to question:

How can a radar device operating in the RF range be induced to emit by input from a laser which emits in the optical range.

On the basis of this apparent lack of understanding, it is deemed in the Office Action that the invention is inoperative, resulting in rejection under 35 USC §101.

Examiner's attention is respectfully directed to U.S. Patent No. 5,307,073 (Riza) which was submitted in an Information Disclosure Statement with the original filing of the present application under 35 USC 371 on April 27, 2000 and which was considered by the Examiner on April 24, 2002. This reference was also considered in the International Preliminary Examination Report (IPER), a translation copy of which is attached hereto, where claim 1 of the IPER corresponding to claim 25 of the present application was deemed to meet all the criteria of novelty, utility and inventive step.

At least in Riza, the general concept of an optically controlled phased array radar was disclosed and described at least as early as the date of the issuance of the Riza patent in April of 1994. As shown in the attached IPER, with reference to Figure 2, of Riza ('073) laser means emitting on different frequencies  $\omega_1$ ,  $\omega_2$

- a) a first and a second laser (laser 134, laser 132) emitting at two different frequencies  $\omega_1$ , and  $\omega_2$ ,
- b) frequency control means for the first and second lasers (control means 140, see column 6, lines 25-28),
- c) an array of N elements arranged in the path of the beam of the second laser, wherein each element introduces a phase delay in the portion of the beam passing therethrough (array 160, see column 7, lines 61-63 and column 8, lines 13-18),
- d) N means for mixing the beam transmitted by the first laser and each of the N delayed beams and for producing N frequency

signals  $\omega_1$ -  $\omega_2$  (photodiode array 182, see column 8, lines 41-60) and

- e) N means (antenna array 100) forming an antenna for emitting a radiation at the frequency  $\omega_1$ - $\omega_2$ .

The present invention differs from 5,307,073 because the invention as defined in the present claims provides an alternative transmitter. The present invention device includes a plurality of end laser transmitter pairs arranged in a tiled configuration as a matrix or as a linear array, wherein each pair of laser transmitters includes a first and a second laser transmitter each emitting at a first and a second frequency  $\omega_1$  and  $\omega_2$  which are different from each other. The other features of the transmitter are features c) to e) mentioned above.

In 5,307,073 there is no plurality of laser transmitters, but the beams are produced by the first and second laser transmitters are divided (means 151 and 152, see Figure 2) into a plurality of sub-beams. Therefore the subject matter of the claims of the present invention are novel and not obvious in view of 5,307,073 and all of the art of record here.

None of the art of record discloses or suggests the arrangement and solution as defined in the present claims 25-47.

Most instructive from U.S. Patent No. 5,307,073 is the statement that "The frequency difference between the first and second beams which form the constituent beams in each combined beam causes an interference pattern that, upon heterodyne detection of the optical signal and conversion to an electrical antenna drive signal, provides control of the carrier frequency for driving the antenna." See Abstract of

5,307,073, claim 20 of 5,307,073 and claim 30 of 5,307,073 and 5,307,073 Column 2, lines 15-33, column 3, Summary of the Invention, top of column 11 to bottom of column 13.

At least with this background in mind as to the physics involved, rejection of claims under 35 USC §101 should be withdrawn.

Claims 25-45 were rejected on the basis that the Specification did not appear to be enabling for a plurality of laser emitter pairs, emitting radiation at first and second frequencies  $\omega_1$ ,  $\omega_2$  and does not reasonably provide enablement for antenna-forming means for emitting radiation at the frequency  $\omega_1 - \omega_2$  for a radar device.

This rejection appears to be founded on the same premise as rejection under 35 USC §101, and apparently does not appreciate the fundamental advancements in the field as reflected six years before the U.S. filing date of the present application as described in U.S. Patent No. 5,307,073. Clearly, the features which the Action deems to be unclear are well understood by those skilled in the art in accordance with the state of the art as reflected in 5,307,073. In addition, the means recited in the present Specification at least at pages 5, 6 and 8, are adequate for those skilled in the art to make and use the invention, and appropriately define the scope of the present invention, in view of the perspective as to the state of advancement in this art as reflected in 5,307,073.

Claims 25-45 were rejected under 35 USC §112 on the basis of support for  $\omega_1$  and  $\omega_2$  being different, how phase delay element imposes a phase delay, understanding of the terms frequency and phase amplitude, and other well-known terms in the art as reflected by 5,307,073. All of the aforesaid features are amply clear in the

present specification and claims, particularly when read in light of the present specification and understanding of one skilled in the art having the necessary background as exemplified in at least 5,307,073, bearing a publication date of six years before the present filing date.

Nevertheless, in order to facilitate prosecution of the present application to allowable subject matter, the claims have been amended herewith to include at least in the independent claims, the following elements:

Limitation to an ultrahigh frequency emitting device; clarification that first and second laser emitters emit electromagnetic waves in the optical domain; and that the production of a number of signals at the ultrahigh frequency  $\omega_1 - \omega_2$  is by heterodyning of the electromagnetic waves.

#### **DISPOSITION OF CLAIMS 46 AND 47**

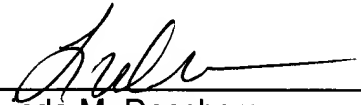
Claims 46 and 47 were added with the Amendment filed August 7, 2002. The Examiner did not comment as to their allowability, thus, indication of allowable subject matter is respectfully requested.

#### **CONCLUSION**

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the

Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

Dated: January 29, 2004 By:   
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